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THE INTERSTATE COOPERATIVE RESEARCH PROJECT ON DECISION MAKING IN FARM MANAGEMENT*

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For Michigan State University Home Management Conference on "The Interrelationships of Values and Decision Making in Home Management."

I assume that Dr. Gross' primary objective in asking me to discuss the Interstate Project was to get the thinking of farm management people on the general subject of decision making out in the open for discussion and examination. Thus, I will describe the Interstate project only enough to give you some idea of its extent and nature and will concentrate the major portion of my paper on the decision making or managerial concepts being investigated in that project. At the end, I will summarize very briefly the types of information we are collecting and point out some opportunities for profitable joint research efforts on the part of home and agricultural economists.

The Project

The Interstate Managerial Project was conceived in the risk and uncertainty subcommittee of the North Central Farm Management Research Committee which is sponsored and financed by the Farm Foundation. In the summer of 1953, a work-conference similar to the one we are attending was held at Bozeman, Montana. Farm management workers from Great Plains as well as North Central States participated in the conference. Attention was concentrated upon the problems of making both individual farm and institutional adjustments to price and yield risks and uncertainties faced by farmers.

During that conference a group of researchers from a number of midwestern states held several breakfast and evening meetings to discuss a possible cooperative project among several states. The purpose of the proposed project was to study the managerial or decision making process by which farmers solve and handle the problems created by the risks and uncertainties of farming. These meetings resulted in the project we are considering today. Experiment stations in the states of Kansas, Iowa, North Dakota, Michigan, Indiana, Kentucky, and Ohio cooperated. Only states with research workers at least moderately well acquainted with the decision making concepts we were going to study became involved.

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In all, probably $70,000 has been spent by the seven states in the last 18 months of this project. Approximately 1,200 farmers have been interviewed in selected areas within each state. Stratified representative samples of single-family farm managerial units within these areas were drawn by the Statistics Laboratory at Ames. In Michigan 230 managerial units were sampled most of which are south of Bay City - Muskegon line. Two somewhat isolated northern Michigan counties were also sampled in order to study the effects of being further away from certain communication centers.

Originally, the plans were to use the consultive services of the Survey Research Center at the University of Michigan in constructing the questionnaires and in training the interviewers. This, however, proved unnecessary as we located Dr. Joel Smith in the Department of Sociology and Anthropology who is experienced and well trained in this type of work. Doctor Smith aided with question construction, pretesting the schedule, the operation of an interviewer training school at Purdue University last summer, the establishment of I.B.M. codes and in the coding process. The study will code onto 6 IBM cards about 3 of which are now coded. We expect to complete coding this summer.

Decision-Making Concepts

The concepts on which the interstate managerial study is based are part of a rapidly evolving system of thought. As this system of thought is not developing evenly across the country, it is necessary to discuss its historical development so that those of you who are familiar with it can see what point in the development of that system the project originated.

Early History of Farm Management Thought. In the field of farm management there are, roughly speaking, two schools of thought. One of these tends to be empirical, the other, experimentalist in the sense that both theoretical and empirical tools and objectives are used and pursued. Until the middle forties or so the empirical and experimentalist schools of thought came out at about the same place with respect to decision making or managerial concepts - - nowhere!

In the very beginning, the empirical school of thought was probably more realistic as it dealt with farmers and their decision-making problems just as they occur "in nature." Members of the empirical school, however, found the price and yield variations of agriculture very disconcerting. The natural thing to do was to "average out" these variations by establishing the concept of "normal" prices and yields. This they did. Once normals or averages were established for prices and yields it was possible to ignore the problems created by variations and to construct farm plans, budgets and land appraisal forms based on them. Circumvention of price and yield risks and uncertainty with normals and averages eliminated most of the need for concern with the process through which farm managers study the problems created for them by change and variations and adjust their businesses to the solution of those problems.

The experimentalist farm managers did little better. They borrowed and employed static economic concepts from classical and neo-classical economists. These concepts also circumvent problems created by changes

and variations. They do this by assuming that such changes do not occur. Value systems, for instance, and the patterns of wants and preferences held by the people in the economy are assumed constant. So are production functions and relationships as are institutions including the distribution of property ownership among people. These assumptions eliminate most of the important problems about which managers have to reach decisions. Hence, the experimentalist, like the empirical farm management man, had little need in his conceptual framework for managerial or decision-making concepts. Until the late thirties and early forties, at least, both schools of farm management were barren and sterile as far as the production of managerial or decision-making concepts is concerned.

The mental activity which was to terminate this barreness, however, was already underway elsewhere. At the end of World War I and in the field of general economics, Professor Frank Knight of the University of Iowa and Cornell was studying risk and uncertainty in relation to profits and management in economic theory.[1] Knight pointed out rather clearly that the assumptions of classical static economic theory eliminate managerial concepts from static economics. He reasoned that it was the existence of change in the real world which makes it necessary for each business to have in it a decision making unit.

In a Journal of Farm Economics article published in 1939, T. W. Schultz based himself solidly on Knight's work and pointed out the sterility of both the empirical and experimentalist approaches to farm management as far as managerial concepts are concerned.[2] This article sparked the experimentalists to re-examine their theoretical concepts and became a turning point in the field of farm management. The re-examination of theoretical concepts has been more pronounced among midwestern than among east-coast experimentalists.

The empiricists, however, were virtually unresponsive to Schultz' article. The unresponsiveness of the empiricists continues today among many farm management extension workers at this and other institutions despite the fact that they are engaged in carrying out a Farm and Home Development program which has as its very core the decision-making process of the farm family.

The response of the experimentalists has taken several forms. Work on price expectations at Iowa by Brownlee, Gainer, Schultz, and D. Gale Johnson materialized into the forward pricing policy recommendation.[3] Heady, at Ames, wrote on flexible farming and uncertainty in the late forties.[4] Articles appeared on needed theoretical developments for

1. F. H. Knight, Risk, Uncertainty and Profit, Houghton Mifflin, New York 1921
2. T. W. Schultz, "Theory of the Firm and Farm Management Research," Journal of Farm Economics, XXI, pp. 570-586. 1939.
3. D. Gale Johnson, Forward Prices for Agriculture, The University of Chicago Press, Chicago, 1947.
4. Earl O. Heady, "Flexible Farming," Iowa Farm Science, Vol. 43, pp. 10-12. 1948; "Uncertainty in Market Relationships and Resource Allocation," Journal of Farm Economics, XXXII, pp. 240-257, 1950.

farm management.[5] In 1953, Cecil Haver and I attempted to draw together the decision making principles relevant to farm management.[6] This summarization drew in the sequential decision-making principle of Abraham Wald as well as the theory of game concepts developed by Von Neumann and Morganstern. This summary was followed by some pilot and case study work on the decision making process at Kentucky[7] which is reported in a Kentucky agricultural Experiment Station Bulletin 619. The concepts brought together in these works form the nucleus around which the interstate project is built. In what follows, I shall discuss the outline and major elements of those concepts.

Types of variations creating need for Decision Making. Examination of the assumptions of static economic theory indicates that the circumvented changes and variation are primarily in the following areas:

(1) Production responses with given technology
(2) Prices
(3) Institutions
(4) Human Relationships, and
(5) Technology

Empirically as well as deductively, bits of information about changes occurring in these areas seem to be the building blocks with which farm and home decisions are built.

Changes in Values Systems Play a Unique Role. Changes in values and patterns of wants and preferences while subsumed into the human relationships and institutions catagories are really distinct from the other types of changes. This is clearly seen when it is realized that if the managerial unit has a concept of "what ought to be" - a value, and a concept of "what is" - a belief; a significant difference between the two constitutes a problem to be solved and handled by the managerial unit. These values and consequent wants and preferences constitute half of each problematic situation faced by managers.

No Clear Cut Classification of Managerial Problems Exists. The problems which arise for managers often involve complexes of different kinds of changes we have described. For example, a farmer and his wife may believe that their income is lower than it ought to be. This problem may have been created by a number of changes such as, for instance, changes in their concept of what is an adequate standard of living, changes in prices received, changes in prices paid, changes in the productivity of their resources and even changes in such institutional arrangements as the income tax structure or the price support programs. Efforts to classify the problems which managers handle have been relatively fruitless to date though

5. Glenn L. Johnson, "Needed Developments in Economic Theory as Applied to Farm Management," Journal of Farm Economics, XXXII, pp. 1140-1156, 1950.
6. Glenn L. Johnson and Cecil B. Haver, Decision Making Principles in Farm Management, Ky. Bul. 593, January 1953.
7. Glenn L. Johnson, Managerial Concepts for Agriculturalists, Ky. Bul 619, 1954.

one thing is clear--the problem classifications of static economic theory are inadequate. In static theory the micro-problems are (1) allocation of income among competing and often conflicting uses including savings and productive investments, (2) selection of productive resources to produce a given product, (3) combinations of enterprises and (4) scale of operations. This static classification leaves out the problems associated with changing technology (farm or home), asset accumulation to start farming or to educate the salary earner, changing value systems, family life cycles, institutional changes, etc.

Farm Business and Home Decisions are Necessarily Related. Many present day farm managers are convinced that attempts to find a non-arbitrary separation of the farm into the business and home-making sides for purposes of studying the decision making process are futile. In dynamics, the clear cut static distinction between the firm and household disappears. Non-monetary as well as monetary objectives are crucial in defining problems on both sides. Farmers for instance often organize their businesses so as to secure a smaller but more stable income because they and their families prefer a smaller more stable income to a larger less stable one. Insurance of property is gradually carried NOT for business reasons but to protect the family consumption pattern. Farmers also take long business chances, sometimes at unfavorable odds, not to make money but to secure land ownership and all the rights and privileges which adhere to a land-owning farm family in a rural community.

When one looks at the consumption end of farming he finds almost as much production as consumption. The household is often more of a production center than the barn. My wife's machinery investment exceeds, even in 1929 dollars, my father's 1930 investment in farm machinery. Within the home, housing is provided, children are tended, food is prepared and vegetables are processed not to mention the production of most of the esthetic services enjoyed by farm families. It is likely that on over half of the census farms in the U.S., the value of the services produced in the household exceeds the value of the products produced in the barn and in the fields. The consumption of household aspects and the production or firm aspects of the farm are inevitably and inseparately intertwined. The realization on the part of the modern economic theorist that this is generally true is paralleled by a similar specific realization that this is true on farms as revealed by the experience of the Extension Service and the Land Grant Colleges of the U.S. The Farm and Home Development Program or, as it is sometimes called, the farm unit approach recognizes that there is essentially one managerial process on a farm which interrelates household and the farm decisions and that to attempt to plan one in ignorance of the other is folly. I'm sure the same is true of the consumption and income producing activities of urban families.

The realization that value systems are crucial on both the production and consumption side and that this situation inseparably unifies farm and home making decisions is of utmost importance. Agricultural college personnel have tended to be scientific not humanistic. Scientific objectivity has been emphasized. The study of value systems has been played down. It is the rare worker who has had courses in philosophic value theory and ethics. Land-Grant personnel, however, have been effective in developing value systems among farm people. Despite statements that the objective is to

"help farm people do what they want to do," the Land-Grant system has "motivated" farm people by emphasizing (oftentimes very openly) such native virtues as thrift, material accumulation, sanitation, honesty, the "good" aspects of rural living, self-sufficiency, freedom, independence, gracious living, music appreciation and household aesthetics.

Decision-Making Goes Far Beyond Economics. Study of value systems and patterns of wants and preferences falls partially, at least, in the humanities. Thus, the study of management and of decision-making goes beyond the sciences of agricultural and home economics. Management or decision-making is broader than the science of economics -- it is a science and an art running from deep in the field of philosophy on one hand too deep into such technical fields as soil physics and nutrition on the other hand. In between these extremes, it touches on home technology, agricultural policy, private policy, interior decorating, farm business accounting, child development, home accounting, dairy management, swine production, etc. What we may ask then, is the contribution which economics has to make to an understanding of the decision-making process?

The Contribution of Economics to Decision Making. Economics deals with efficiency in using scarce resources in the attainment of a wide variety of goals, many of which are competing. To limit economics to profit maximization would rob it of many rightful functions. Efficiency is an instrumental end involved in attaining all other ends. Therefore, to speak of economic versus non-economic ends is confusing and almost meaningless. Questions of efficiency or of economy exist in attaining any of the multitudinous ends to which a farm family may aspire whether those ends be security, a higher income, a landscaped yard, a culturally satisfying home, well-bred livestock, or, for that matter, whether the ends are good or bad.

Questions on efficiency are also involved in the process of making decisions involved in attaining those ends. Decision-making is a costly irritating process. Much expenditure of time, effort, money, and sleepless nights is entailed in making the decisions involved in managing a farm family and a farm business. The common economic principles defining efficiency apply and can be used to define efficiency in the managerial process. It is at this point that economics has something unique to contribute to an understanding of the managerial process.

The Functions of Management. Assuming that a problem has been identified, five subfunctions or subprocesses are recognized within management. These are.

1. The observation or acquisition of information relevant to solution of the problem.
2. The analysis of information.
3. The making of decisions.
4. The putting of the decisions into action.
5. And, lastly, the acceptance of responsibility for the consequences of actions taken.

These five sub-parts of the management process are conceived to be highly interrelated. For instance, responsibility borne for the consequences of an action partially determines the accuracy with which the decision to act is made. And, the required accuracy in the decision in turn determines

the amount of analysis and the amount of information which must be acquired before the decision can be made. These interrelationships among the five sub-processes of management make it evident that a complete management act involves all five processes.

There is an element of economizing in carrying out the observations. For instance, it does not pay to acquire additional information which is worth less than the cost of acquiring it. Similarly, it does not pay to carry analysis beyond the point at which the results of additional analysis are worth less than the cost of carrying it out.

These costs and these returns are personal subjective things. This intimately relates the functions of management to value systems. What information and analysis are worth, for instance, depends upon the importance of the problem. And the importance of the problem depends upon the value system to which the managerial unit adheres.

The Analytical Tools of Management. There are many different thought processes and structures employed by managers in solving problems. These often contribute to efficiency in both observation and analysis. One of these thought structures is marginal analysis. Marginal analysis, for instance, contains principles for making decisions about competing and conflicting ends, a problem which was bothering this group yesterday afternoon. Another system of analysis, which is a less formal equivalent of marginal analysis, is the budgeting procedures taught by home economists and farm managers alike. There are also probability calculations involving concepts of chance, risk, and averages.

More broadly speaking inductive and deductive thought process are involved. There are also rules of thumb taught by both farm management people and home economists. For instance, in the field of farm management, the, "land use approach" to farm organization is well known while our Michigan Extension Farm management people use what has been dubbed a "labor use" approach to farm organization. Home economists have corresponding rules and approaches for simplifying household work and organizing kitchens and laundries.

Degrees of Knowledge and Kinds of Actions taken by Managers. In dealing with farmers and home-makers, differences in their receptivity to different kinds of information are noted. The state of their knowledge and the kinds of actions they are taking determine this receptivity. Knight, in considering the degrees or amounts of information which a manager might have, distinguished three cases: risk, uncertainty, and certainty. According to Knight, risk existed when knowledge about a future outcome was good enough for the outcome to be predicted subject to a probability distribution. Uncertainty, according to Knight, existed when knowledge about a future event was so poor that no probability distribution could be attached to a prediction. Certainty, at the other extreme, existed, according to Knight, when knowledge about a future event was so accurate that the prediction was not subject to error.

Abraham Wald, a modern day statistician made it possible to extend Knight's concepts by developing the idea of sequential analysis. In sequential analysis, the analyst analyzes successive batches of information in trying to accept or reject an hypothesis. After analysis of each batch, the analyst decides (1) to either accept the hypothesis or (2) to reject it or

(3) to continue accumulating information. The decision to continue accumulating information is one often made by managers in analyzing the batches of information they acquire. When a manager elects to continue observation and analysis before making a decision he can be said to be in a learning situation. Acceptance or rejection of an hypothesis corresponds to the decision step in the management process---such decisions are based on imperfect knowledge. Therefore, actions based on such decisions can be referred to as risk actions.

On the basis of Wald's analysis, the following situations, dealing with the amount of information which a manager may have and the kinds of action he is taking have been defined: A manager is in a learning situation when he believes the additional information he can acquire by observation or analysis is worth more than it costs. He is in a risk action situation when he is convinced his information is adequate for him to make a decision which he is ready, willing, and able to bear the consequences of and that the cost of more information is more than equal to its value. He is in a forced action situation if the value of more information exceeds the cost of acquiring it and some outside force makes action mandatory. A manager may also be in the inaction situation. In the inaction situation, information is inadequate for positive action and the problem is so unimportant that additional observation or analysis would not yield a return in excess of cost. Lastly, managers may be in the certainty situation. There is a tendency now to define certainty as the situation which exists when a manager regards the information he possesses about a future event so perfect that he can act on the basis of his predictions without taking precautions. Defining certainty this way rather than in terms of possessing complete accurate knowledge avoids certain philosophical questions about the presence or absence of complete determinism in the universe.

The Utility of Income Gains and Losses. Possible income gains and losses are crucial in making decisions involving risk. If increasing marginal utilities are assigned to income gains, a rational manager should be expected to accept unfair odds to get a chance of receiving a larger income. Similarly, if increasing marginal disutilities are attached to losses, a rational manager should be expected to accept unfair odds to avoid chances of incurring such losses. Many business gains are available only at unfair odds. All contractual insurance schemes involve odds unfair enough to pay profits and administrative costs to the insurance company. Increasing marginal utilities apparently occur mainly for income gains capable of bringing about a significant gain in socio-economic position. Over $5,000 appears to be required of M.S.U. graduate student families before increasing marginal utility for money is encountered, according to a pilot study by Halter and Beringer of our department. For mature, commercial farm families the figure probably exceeds $25,000. No wonder, we have trouble motivating farmers to accept recommendations known to be something less than 100 percent reliable, to say the least, which involve only $50 or $100 gains. Understanding of insurance and other decisions (involving risks) depends on factual information about the marginal utilities attached to gains and losses by the person involved.

present day thinking considers it possible to measure utility cardinally as well as ordinally. The writing of Friedman, Savage, Von Neuman, Morgenstern and Allais are fundamental to an understanding of this thinking.[8]

Informal Insurance and Strategy Principles. Setting up safety margins, saving for a rainy day and the expression "a stitch in time saves nine" bring to mind the informal arrangements whereby farm and home managers protect themselves against unforeseen changes. Discounting of expected returns is a procedure which greatly affects the investment and consumption patterns of families. Here the values attached to security, current consumption, property, and future income are important. The value of liquid assets as a source of flexibility in decision-making also affects consumption and investment patterns thus basically influencing the entire pattern of activity in the farm-home complex.

Strategies are personal as well as impersonal. Little is known and virtually nothing is taught in the field of farm management about making decisions when personal strategies are involved. And, if I'm not mistaken, nothing is taught in this area in home economics though I'm sure a course entitled "How to Handle Husbands" would be an extremely popular one among co-eds and would, in turn, create a counter demand for a masculine course entitled "How to Out-Maneuver Wives." Family socialism, like the Kremlin, has its struggles for power and purges with the line between cooperation on one hand, and collusion or intrigue on the other often very thin and hard to discern.

Types of Information and Opportunities

The types of information being collected on the decision-making process in the Interstate Managerial Survey fall under 10 headings. They are questions designed to secure information on:

1- What we call control variables.
2- Types of information used by decision makers.
3- Analytical procedures and performance of the five managerial functions.
4- Sources and means employed in securing information.
5- Expectation models employed in forcasting future events.
6- Insurance strategies.
7- Degrees of knowledge and kinds of action taken.
8- Personal strategies.
9- The disutility of losses.
10- The utility of gains.

From the standpoints of both home management and the Farm Home Development Program of the Extension Service (as well as of farm management) much of the data secured should be very pertinent and crucial.

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8. M. Friedman and L. J. Savage, "The Utility Analysis of Choices Involving Risk," Journal of Political Economy, Vol. 56, pp. 279-304, 1948; J. Von Neumann and O. Morgenstern, The Theory of Games and Economic Behavior Princeton University Press, Princeton, 1944; and M. Allais, "Le Comportement de l'Homme Rationnel Devant le Risque; Critique des Postulats et Axiomes de l'Ecole Americaine "Econometricia Vol 21 pp 503-546 1952.

The control questions will make it possible to study the decision-making process in relation to age, family composition, tenure status, experience, education, income, net worth, debt positions, etc.

The information questions deal with types of information used by farmers in organizing farms for family satisfactions as well as for profits. The patterns of information used by farmers, it appears tentatively, do not agree with the pattern of information produced by the experiment stations and extended by the extension service. Farmers apparently used proportionally more information on institutions, human relationships, and value systems that is handled by the Land-Grant system.

Answers to questions on analytical methods used by farmers will probably indicate a relatively greater emphasis on deduction and less emphasis on "learning by doing" among farmers than in the vocational agriculture and extension teaching circles. The potential implications of this for Land-Grant educational policies are self-evident.

The investigation of expectation models should yield insights into the patterns of thought used by farm people in predicting the future. Probably, very significant differences exist in these patterns depending on whether a farmer is dealing with prices, institutional changes, new technology or future yields of a new crop variety.

Answers to the questions investigating insurance strategies should interest farm and home economists alike though the emphasis runs rather heavily toward the production end of farming.

Questions about risk actions, the learning situation, forced action, inaction, and the certainty situations are bringing in answers which may make some theoretical reformulations necessary.

The personal strategy questions will probably yield some insights, if not degrees of freedom and specific information, of use in guiding future research in both farm and home decision making.

The two questions on utilities of gains and losses are probably the most rigorously formulated in the study. We expect to secure some real facts about the value attached to gains and losses of incomes. Such facts are basic to understanding the whole complex of consumption, investment, savings, and insurance decisions made by farm families not to mention the motivation of farm people.

Shortcomings and opportunities for Home Economists. The study is short on questions dealing specifically with home management decisions even though it covers some of the interrelationships between business and home management decisions. Thus, there is a need to supplement the home management end of the study. Similarly, there is a need to supplement the project with study of the role played by the wife and older children in making farm-home decisions. The interrelationships between the decision making roles of husband and wife are also untouched in the present study.

The big need, however, for extension of the Interstate Managerial study is in the area of values. Half of each problematic situation requiring a farm-home decision is defined in terms of values--i.e., concepts of what ought to be. The Interstate Managerial Study is woefully deficient in this very area. I hope that Ester Everett in her Doctoral dissertation being done under Margaret Liston will be able to remedy this situation.

In closing I should like to congratulate Doctor Gross and her co-workers on setting up this conference on the "Interrelationships of Values and Decision-Making in Home Management." As Doctor McKee pointed out, the conference is timely from many standpoints. Society, in general, appears increasingly concerned with value questions. Farm management researchers are in real need of aid and the Farm and Home Development program of the Extension Service is virtually without research aid or explicit understanding of this important area.